

A Pathway to Clean Energy

Nummedal, Dag¹ (1) CERI, Colorado School of Mines, Golden, CO.

Our energy industry is faced with two huge, undeniable problems: the warming of the planet and the costly and destabilizing excessive emphasis on traditional resources from the Middle East. Are these problems unsolvable or do they, together, in fact open an opportunity for a major, overdue, restructuring of this global industry in a way that also greatly enhances economic growth?

Most emissions are related to production of our heaviest hydrocarbons. Combustion chemistry reveals that burning of coal releases about twice as much CO₂ per unit energy as the burning of methane. Moreover, the energy use related to mining and transportation of coal further decreases its net energy contribution by another factor of 2 or 3 (depending on transport distance) relative to methane. So, shifting as much of the global hydrocarbon industry towards natural gas as possible is a huge shift in the right direction. The rapid growth in unconventional gas resources, such as 'tight' gas and shale gas is an important part of this shift. In-situ gasification of other hydrocarbons (such as coal) is another. It is an emerging technology that ultimately could bypass the need for carbon capture and sequestration by leaving the CO₂ in the subsurface to begin with - instead of sequestering it after it is released. Research is also underway for use of new metal catalysts to break down heavy hydrocarbon molecules into lighter ones. Real work on biological transformations of hydrocarbons and the many other pathways to decarbonize the hydrocarbon industry is just beginning.

A serious commitment to research on transforming the world's heaviest hydrocarbons to their lowest-emitting components (natural gas) clearly is good for the climate. It also opens up responsible exploitation of all hydrocarbon resources, which in aggregate are pretty equitably distributed across all nations on earth, thus reducing pressures on politically vulnerable regions.

Add to this the rapid advances in renewable energy development. A 20 percent renewable portfolio standard has become the norm across the U.S. and similar (or higher) targets are in place in some countries overseas. Wind energy may be leading the charge in terms of development, but solar energy is leading the charge in science. Geothermal is the second largest energy resource on earth (after solar) and this is one industry sector where the AAPG community could play a huge role in its advancement.